What is claimed is:

1. A method for forming a minute pattern comprising:

forming a mask layer;

patterning the mask layer to form a first mask pattern having a first width larger than a predetermined width;

thermally treating the first mask pattern to form a second mask pattern having a second width smaller than the first width;

forming a polymer layer on the second mask pattern; and

reacting the polymer layer with the second mask pattern to form a third mask pattern having a third width substantially identical to the predetermined width.

2. The method for forming a minute pattern of claim 1, wherein the mask layer is formed on an insulating layer or a conductive layer formed on a substrate, and a pattern is formed on the substrate by etching the insulating layer or the conductive layer using the third mask pattern.

3. The method for forming a minute pattern of claim 2, wherein the pattern includes a hole or a wiring.

4. The method for forming a minute pattern of claim 1, wherein thermally treating the first mask pattern is performed at a temperature of about 140 degrees C to about 180 degrees C.

5. The method for forming a minute pattern of claim 1, wherein a difference between the first width and the second width is below about 100nm.

6. The method for forming a minute pattern of claim 1, wherein the polymer layer includes a water-soluble polymer.

7. The method for forming a minute pattern of claim 6, wherein the water-soluble polymer comprises a material selected from the group consisting of a melanin based water-soluble polymer, a polyvinyl-based water-soluble polymer and a fluorine based water-soluble polymer.

8. The method for forming a minute pattern of claim 6, further comprising forming a hardened layer at a boundary between the polymer layer and the second mask pattern by reacting the polymer layer with the second mask pattern at a temperature of about 110 degrees C to about 150 degrees C.

9. The method for forming a minute pattern of claim 8, prior to reacting the polymer layer with the second mask pattern, further comprising, prior to reacting the polymer layer with the second mask pattern, exposing the second mask pattern having the polymer layer to a deep ultra violet ray, wherein a remaining polymer layer next to reacting with the second mask pattern is removed by using deionized water.

10. The method for forming a minute pattern of claim 1, further comprising thermally treating the second mask pattern at a temperature of about 90 degrees C to about 130 degrees C.

11. The method for forming a minute pattern of claim 1, further comprising exposing the second mask pattern.

12. The method for forming a minute pattern of claim 1, wherein the mask layer includes a photoresist layer.

13. A method for manufacturing a semiconductor device comprising:

forming a photoresist layer on a target layer formed on a substrate;

patterning the photoresist layer to form a first photoresist pattern having a first width larger than a predetermined width;

thermally treating the first photoresist pattern to form a second photoresist pattern having a second width smaller than the first width;

forming a polymer layer on the second photoresist pattern;

reacting the polymer layer with the second photoresist pattern to form a third photoresist pattern having a third width substantially identical to the predetermined width; and

etching the target layer using the third photoresist pattern as a mask to form a target layer pattern.

14. The method for manufacturing a semiconductor device of claim 13, wherein the target layer includes an insulating layer or a conductive layer.

15. The method for manufacturing a semiconductor device of claim 13, wherein thermally treating the first photoresist pattern is performed at a temperature of about 140 degrees C to about 180 degrees C.

16. The method for manufacturing a semiconductor device of claim 13, wherein a difference between the first width and the second width is below about 100nm.

17. The method for manufacturing a semiconductor device of claim 13, wherein the polymer layer comprises a material selected from the group consisting of a melanin based water-soluble polymer, a polyvinyl-based water-soluble polymer and a fluorine based water-soluble polymer.

18. The method for manufacturing a semiconductor device of claim 13, further comprising forming a hardened layer at a boundary between the polymer layer and the second photoresist pattern by reacting the polymer layer with the second photoresist pattern at a temperature of about 110 degrees C to about 150 degrees C.

19. The method for manufacturing a semiconductor device of claim 18, further comprising, prior to reacting the polymer layer with the second photoresist pattern, exposing the second photoresist pattern having the polymer layer to a deep

ultra violet ray, wherein a remaining polymer layer after reacting with the second photoresist pattern is removed using a deionized water.

20. The method for manufacturing a semiconductor device of claim 13, further comprising thermally treating the second photoresist pattern at a temperature of about 90 degrees C to about 130 degrees C.